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GERAGHTY
& MILLER, INC.
Environmental Services

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EXECUTIVE SUMMARY

During October and November of 1990, Geraghty & Miller performed an evaluation of the ground-water monitoring and containment system at Allied-Signal's former Moundsville facility. The principal findings of this investigation are outlined below and discussed in the following report.

- Measuring-point elevations on existing two-inch diameter wells at Allied Park were re-surveyed by Stegman and Schellhase, Inc. during the evaluation. Well-head elevations measured on January 1982 and October 1990 are generally comparable. Differences in well-head elevations between the October 1990 and May 1978 surveys is attributed to the addition to or removal of well casing to adjust final well height.

- The ground-water elevation data collected on October 1, 1990 indicate that, at current pumping rates, Ranney Wells A, D, and E are preventing the off-site migration of ground water from beneath the Allied-Signal, Hanlin Chemicals, and Olin Corporation sites. These findings concur with past evaluations documented for the ground-water system and a recently-created ground-water flow model prepared by Geraghty & Miller.

- Allied's existing ground-water monitoring network appears to be capable of providing representative water-quality data for the former, remediated formaldehyde pond and blackwater pond, and the former chemical trash dump, despite minor shifts in ground-water flow and damage to monitoring wells 29A and 26B.

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- Water-quality data collected from monitoring wells 29A and 29B were found to be generally comparable. Consequently, well 29B could be proposed as a replacement for damaged well 29A.

- Of the existing wells originally designated for monitoring the former formaldehyde pond and former blackwater pond, wells 25A, B, and C remain optimally situated for the monitoring of ground-water quality alterations. These wells also monitor the encapsulated residuals area located within the former blackwater pond.

- Well clusters 23 and 30 are not situated to provide source-specific water-quality data for the former, remediated solid Waste Management Units. Allied may want to consider dropping these wells from the monitoring network.

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INTRODUCTION

On August 27, 1990, Geraghty & Miller, Inc. was requested by Allied-Signal, Inc. (Allied) to conduct an evaluation of the existing ground-water monitoring well network and the containment system at Allied's former Moundsville facility. The main objectives of this investigation were to:

- Confirm that the existing pumping rate of Ranney Well E is adequate to contain ground water passing beneath Allied Park;

- Determine if the combined pumping of Ranney Wells A, D, and E at existing rates is maintaining ground-water containment beneath Allied Park, Hanlin Chemicals-West Virginia, Inc., and Olin Corporation properties; and to

- Evaluate the existing ground-water monitoring well network at the Allied Park site for its effectiveness in providing representative water-quality data and in addressing WVDNR monitoring requirements.

By this investigation, Geraghty & Miller reviewed available hydrogeologic information for the Round Bottom area and performed a site inspection which involved a general assessment of observable monitoring well conditions, re-surveying of selected well-head elevations, and the collection of a complete round of ground-water levels from all accessible Allied and Hanlin Chemicals-West Virginia, Inc. wells. The findings and interpretations of this study are described in the following sections.

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GROUND-WATER CONTAINMENT SYSTEM

The operation of chemical production facilities within the northern portion of Round Bottom has resulted in the degradation of ground-water quality beneath the former Allied north and south plants. Three Ranney radial collector wells designated A, D, and E are continuously pumped to prevent the offsite migration of affected ground water from beneath these facilities to the Ohio River and to the south, towards the Moundsville Country Club well and the Washington Lands well field. Hanlin Corporation currently operates the Ranney Wells A and D and, under caretaker's agreements with Olin Corporation, Ranney Well E. Hanlin owns and currently operates the former Allied south plant. Olin owns the now-closed Allied north plant. A portion of the Allied north plant encompassing several remediated Solid Waste Management Units (SWMUs) remains under Allied ownership (Allied Park). The three properties are hereafter collectively referred to as the Moundsville site.

The potential for contamination of off-site water-supply wells has been a principal concern of the United States Environmental Protection Agency (USEPA) and the West Virginia Department of Natural Resources. To address these concerns and to confirm the effectiveness of Ranney well pumping in controlling ground-water flow, Allied periodically retained Geraghty & Miller to perform evaluations of the ground-water containment system at the Moundsville site. These studies have repeatedly indicated that pumping of Ranney Wells A, D, and E is preventing the off-site migration of ground water from beneath the Moundsville site (Geraghty & Miller, Inc., 1987). These observations were confirmed using a two-dimensional ground-water flow model prepared for the Moundsville site by Geraghty & Miller (Geraghty & Miller, Inc., 1990).

On October 1, 1990, Geraghty & Miller, Inc. collected a complete round of ground-water levels from all accessible monitoring wells on Allied Park and Hanlin Chemicals-West Virginia, Inc. properties, from Ranney Wells A, D, and E, and from the Ohio River at the Hanlin river-water intake. These water levels were converted to ground-water elevations relative to mean sea level. Ground-water elevations from deep (A-series) monitoring wells were plotted on a site base map and

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contoured to depict the generalized ground-water flow patterns within the lower portion of the alluvial aquifer shown on Figure 1. Water-level data are presented in Appendix A.

As part of the evaluation, all measuring-point elevations for existing two-inch diameter monitoring wells located within Allied Park were re-surveyed by Stegman and Schellhase, Inc. of Wheeling, West Virginia. Measuring-point elevations for Allied Park and Hanlin Chemicals-West Virginia, Inc. monitoring wells were determined using a common reference elevation, to permit the development of area-wide ground-water flow maps.

A comparison of measuring-point elevations determined in October 1990, January 1982, and May 1978 is given in Appendix A. Significant differences in measuring point elevations from 1990 and 1978 are attributed to the lengthening of well casings in response to unit closures or other site activities.

The generalized ground-water flow patterns depicted on Figure 1 indicate that, on the day of measurement, the three Ranney wells were being operated at rates which prevent the off-site migration of ground water from beneath the Moundsville site. These flow patterns were found to vary somewhat from those identified during early investigations. However, there is no indication that off-site migration of ground water is occurring, either to the Ohio River or to the south.

Under existing pumping rates, Ranney Well D appears to exert the greatest influence on ground-water flow at the Moundsville site. A significant portion of the ground-water flow passing beneath the Hanlin facility and the former Olin facility is collected by this well. Similarly, much of the ground water beneath the former lime pond at Allied Park is influenced by Ranney Well D. The influence of Ranney Well A, operated at an estimated pumping rate of 310 gpm on October 1, appears limited to the southernmost portion of the Hanlin site, and offsite to the south.

Converging cones of influence from Ranney Wells D and E create a ground-water divide near the general vicinity of destroyed monitoring wells 17 and 18. Under existing pumping rates, ground

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water beneath the remediated SWMUs appears to be captured by Ranney Well E. Variations in the relative withdrawal rates from Ranney wells could result in a component of flow under Allied Park to migrate towards Ranney Well D.

TABLES

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GROUND-WATER MONITORING SYSTEM EVALUATION

Background

In accordance with post-closure monitoring requirements for the remediated SWMUs at Allied Park, Allied performs quarterly water-quality sampling of selected monitoring well clusters on the Allied Park site. Monitoring wells included in this sampling program, along with pertinent well construction and hydrogeologic information are listed in Table 1.

The ground-water monitoring system currently used to monitor the former impoundments and disposal area were installed by Geraghty & Miller during a preliminary investigation of the Allied north plant in 1978. Each monitoring well cluster consists of two to three wells completed into the unconsolidated formation(s) underlying Allied Park. The screened intervals of monitoring wells included in Allied's quarterly monitoring program, and the principal composition of the unit being monitored, is given in Table 1. A detailed description of the unconsolidated deposits encountered beneath the former Allied north plant, and monitoring well construction and placement is given in the document "Ground-Water Contamination at Allied Chemical Corporation (North) Plant Site" (Geraghty & Miller, Inc., 1978). Generalized geologic cross-sections prepared from data obtained in this report are presented on the Figure 2 and Figure 3 cross sections.

Existing Condition of Monitoring Wells

Closure plan approvals from WVDNR require Allied to sample and analyze ground water from selected monitoring wells in clusters 22, 23, 24, 25, 26, 28 and 29. In addition, Allied is voluntarily sampling monitoring wells 30A, 30B and 30C. Based upon the information provided by Allied, and the monitoring well inspection performed by Geraghty & Miller on October 1, much of the existing monitoring well network appears to be capable of providing representative water-level elevation data, and reportedly yield sufficient ground water for sample collection. However, due to the age of the ground-water monitoring wells and their short, three-foot screen lengths, some reduction in well yield over time is likely to have occurred.

Several wells comprising the monitoring network were found to be unusable. Monitoring well 26B has a plugged well casing. Well 29A is currently inaccessible for either water levels or ground-water samples, due to a severely bent casing. As described below, monitoring well 29B appears to provide water-quality data comparable to that obtained from well 29A and may serve as an adequate replacement. Ground-water levels measured in wells 30A, 30B and 30C were found to be lower than would normally be expected. This may indicate that the well screens and/or gravel packs surrounding the well screens may be clogged with fines, or that incrustation of the well screen may be occurring. Well 30B is also reported to have a plugged well casing. The sampling of well cluster 30 is not required by the WVDNR, but is performed on a voluntary basis by Allied.

Well Placement and Completion

Former Chemical Trash Dump

Monitoring wells 22A and B, 24A and C, 26A and C, and 28A and C comprise the ground-water monitoring system selected by the WVDNR for the former chemical trash dump. The generalized ground-water flow paths depicted on Figure 1 illustrate that well clusters 26, 24, and 28 are the best situated of existing monitoring wells for monitoring the former dump. Well cluster 28, situated north and slightly west of the former dump, does not appear to be situated immediately downgradient of this unit, and consequently may be monitoring the outer edge of the contaminant plume.

In general, monitoring wells installed to evaluate/monitor ground-water quality should be screened within the same water-bearing unit to provide data that are both representative of existing conditions and comparable. Parameters such as chemical absorption and exchange rates, ground-water flow velocities, and general water chemistry may vary appreciably between adjoining water-bearing units having different particle size and composition, possibly resulting in data that are not directly comparable between monitoring wells. The shallow, or C-series monitoring wells installed near the former dump, are screened in either the uppermost portion of the sand and gravel aquifer, or within the overlying silt deposit, and are believed to provide representative and comparable data for the silt unit. Two of these borings, 24C and 26C, are situated within or immediately adjacent to the former dump, and exhibit some of the highest observed contaminant concentrations.

The deep, or A-series wells, are screened immediately above or near the bedrock interface. Well 29A and 26A are screened across a silt and clay-rich water-bearing unit, whereas wells 24A and 28A are screened within the sand and gravel aquifer (see Figures 2 and 3). Although these wells monitor different water-bearing units, and may not yield directly comparable results, the placement of well screens is appropriate for intercepting a sinking contaminant plume of the type which allegedly exists beneath the former dump.

Monitoring wells 29A, 29B, and 29C provide water-quality data upgradient of the former chemical trash dump. Well 29B is screened within the central portion of the sand and gravel aquifer, while well 29A is completed within an underlying clay-rich deposit. Although the clay-rich deposit is no longer monitored with the loss of well 29A, water-quality data collected from monitoring wells 29B and 29C may be sufficient to support evaluations of upgradient/downgradient ground-water quality. Water-quality data collected from wells 29A and 29B also contain a similar range in contaminant concentrations and types of contaminants present implying that 29B could be substituted for 29A in the ground-water monitoring program.

Former Waste Ponds

The post-closure monitoring system for the former formaldehyde pond (Pond 2) and former blackwater pond (Pond 3) consists of monitoring well clusters 22, 23, 25, 26, and 29. Both SWMUs were remediated by fixation and encapsulation of pond contents. Consolidated residuals were emplaced in the easternmost portion of Pond 3. Changes in Ranney Well D and E pumping rates in response to plant closures and changing water requirements have caused minor shifts in ground-water flow beneath the former pond area. Although these shifts do not affect the containment of ground water by Ranney Well E, the relationship between source areas and downgradient monitoring wells has in some cases been altered. Of the wells comprising the monitoring network, wells 25A, B, and C remain optimally situated for monitoring the consolidated materials from former Ponds 2 and 3. A minor component of flow originating beneath the former dump may also be monitored by well cluster 25.

Well clusters 26 and 23 are not located hydraulically downgradient of the former ponds or the encapsulated materials residing within the eastern portion of former Pond 3. Well cluster 23 provides water-quality data for the former TDI field and upgradient portions of the former Olin facility, while cluster 26 monitors the former trash dump.

Wells 30A, B, and C have been included in the Allied ground-water monitoring program since 1988. These wells intercept ground-water flow components originating from the former TDI area, as well as from the former pond area. As a result of this merging of plumes, these wells do not provide ground-water quality information for any specific source area, but of general ground-water quality in the vicinity of Ranney Well E.

Each of the monitoring wells comprising well clusters 25 and 30 are screened within either the upper, middle, or lower portions of the sand and gravel alluvial aquifer. This placement facilitates the zone-specific monitoring of the alluvial aquifer and assessment of the vertical distribution of contaminants moving towards Ranney Well E.

CONCLUSIONS AND RECOMMENDATIONS

The ongoing pumping of Ranney Wells A, D, and E remain the principal source of ground-water discharge in the vicinity of the Moundsville site. At current pumping rates, ground water is not migrating towards the southern pumping centers at the Moundsville Country Club or the Washington Lands well field. Ground-water elevations also indicate that the Ohio River is recharging the alluvial aquifer along the length of the Moundsville site in response to pumping. Based upon these observations, modification of the existing ground-water pumping program at the Moundsville site is not warranted.

The Allied Park post-closure ground-water monitoring system currently has two monitoring wells (wells 26B and 29A) in an inoperable condition. Due to similarities in the makeup and concentrations of organic constituents in upgradient monitoring wells 29A and 29B, the continued sampling of well 29B is recommended. Wells 29B and 29C should provide sufficient representative upgradient water-quality data to facilitate assessment of changes in ground-water quality.

The former formaldehyde and blackwater ponds were remediated by consolidation and fixation of pond residuals and placement of these materials into a lined area situated in the former blackwater pond. Based upon existing ground-water flow patterns, wells 25A, B, and C appear best situated for monitoring ground-water quality downgradient of the unit. Continued monitoring of this well cluster should be sufficient to assess changes in ground-water quality downgradient of the former ponds and encapsulation area. Well cluster 30 is not sited to provide source-specific water-quality data from the former pond area.

In summary, Allied's existing ground-water monitoring network appears capable of providing representative water-quality data for the former trash dump, former Ponds 2 and 3, and the pond residuals encapsulation area. Monitoring well clusters 23 and 30 do not monitor these units, but continue to be sampled on a quarterly basis by Allied. Allied may want to consider dropping these well clusters from the ground-water monitoring network.

REFERENCES

Geraghty & Miller, Inc., 1978. Ground-Water Contamination at Allied Chemical Corporation (North) Plant Site, Moundsville, West Virginia, May 1978.

Geraghty & Miller, Inc., 1990. *Site-Wide Ground-Water Flow Model for the LCP Chemicals-West Virginia Moundsville Site*, April 6, 1990.


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TABLE 1

ALLIED–SIGNAL GROUND–WATER MONITORING SYSTEM
WELL/SAMPLING DATA SUMMARY TABLE

ALLIED–SIGNAL INC.
MOUNDSVILLE, WEST VIRGINIA

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FORMER BLACKWATER POND AND FORMALDEHYDE POND

WELL DESIGNATION	UPGRAD./ DOWNGRAD.	WELL STATUS	STRATA MONITORED	SCREENED INTERVAL (ft. below grnd.)	SAMPLING REQUIRED	DATES SAMPLED
22A	U	F	Sand & Gravel	42.3–45.3	Y	9/83–6/90
22B	U	F	Silty Clay	24.5–27.5	Y	9/83–6/90
29A	U	B	Silt & Clay (same as 26A)	60.9–63.9	Y	9/83–9/87
29B	U	F	Sand & Gravel (middle)	40.7–43.7	Y	9/83–6/90
29C	U	F	Silt (same as 24A)	30.0–33.0	Y	9/83–6/90
23A	D	F	Sandy Silt	37.2–40.2	Y	12/88–6/90
23B	D	F	Sandy Silt	28.9–31.9	Y	9/83–6/90
25A	D	F	Sand & Gravel	71.0–74.0	Y	6/87–6/90
25B	D	F	Sand	50.3–53.3	Y	9/83–6/90
25C	D	F	Gravelly Sand	29.2–32.2	Y	9/83–6/90
26A	D	F	Silt & Clay (same as 29A)	81.4–84.4	Y	9/83–6/90
26B	D	P	Sand & Gravel (middle)	55.8–58.8	Y	
26C	D	F	Silt & Clay Lense	34.3–37.3	Y	9/83–6/90

CLOSED TRASH DUMP

WELL DESIGNATION	UPGRAD./ DOWNGRAD.	WELL STATUS	STRATA MONITORED	SCREENED INTERVAL (ft. below grnd.)	SAMPLING REQUIRED	DATES SAMPLED
22A	U	F	Sand & Gravel	42.3–45.3	Y	9/83–6/90
22B	U	F	Silty Clay	24.5–27.5	Y	9/83–6/90
24A	D	F	Sand & Gravel	91.4–94.4	Y	9/83–6/90
24B	D	F	Sand & Gravel (middle)	58.1–61.1	N	5/88–6/90
24C	D	F	Silt	33.6–36.6	Y	9/83–6/90
26A	D	F	Silt & Clay (same as 29A)	81.4–84.4	Y	9/83–6/90
26B	D	P	Sand & Gravel (middle)	55.8–58.8	N	
26C	D	F	Silt & Clay Lense	34.3–37.3	Y	9/83–6/90
28A	D	F	Sand & Gravel	74.3–77.3	Y	9/83–6/90
28B	D	F	Sand & Gravel (middle)	56.0–59.0	N	12/88–6/90
28C	D	F	Sand & Gravel/Silt & Clay	39.9–42.9	Y	9/83–6/90
30A	D	F	Silty Sand & Gravel	68.6–71.6	N	12/88–6/90
30B	D	P	Sandy Gravel	51.1–54.1	N	6/89–6/90
30C	D	F	Sandy Gravel	34.2–37.2	N	12/88–6/90

F: Monitoring well is functional condition.
B: Monitoring well casing bent, preventing sampling.
P: Monitoring well plugged, preventing sampling.

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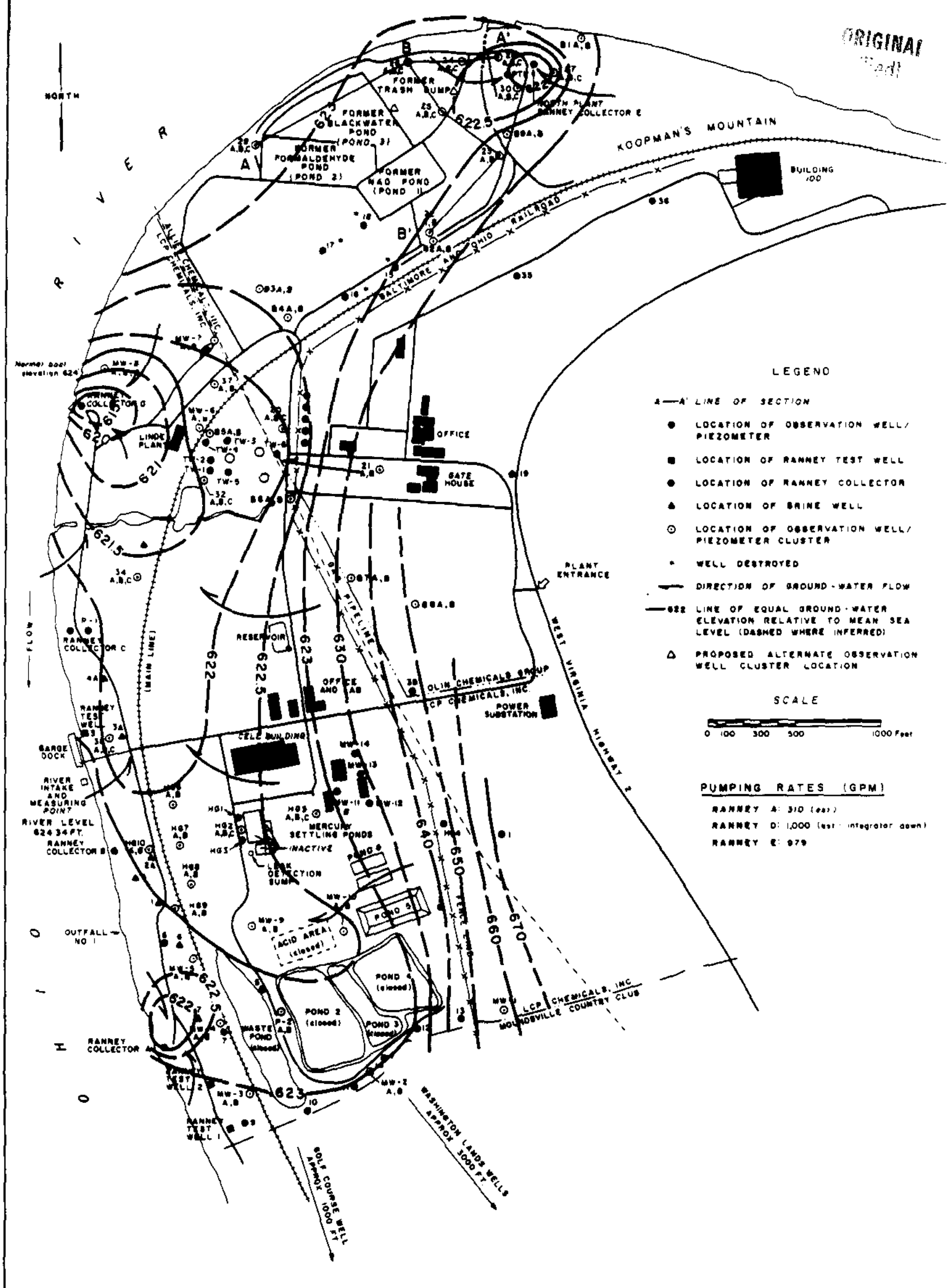

FIGURE 1

GENERALIZED GROUND-WATER FLOW CONFIGURATION WITHIN THE LOWER PORTION OF THE ALLUVIAL AQUIFER ON OCTOBER 1, 1990 AT ALLIED-SIGNAL, INC., OLIN, INC. & HANLIN CHEMICALS, INC

ALLIED-SIGNAL, INC
MOUNDSVILLE, WEST VIRGINIA

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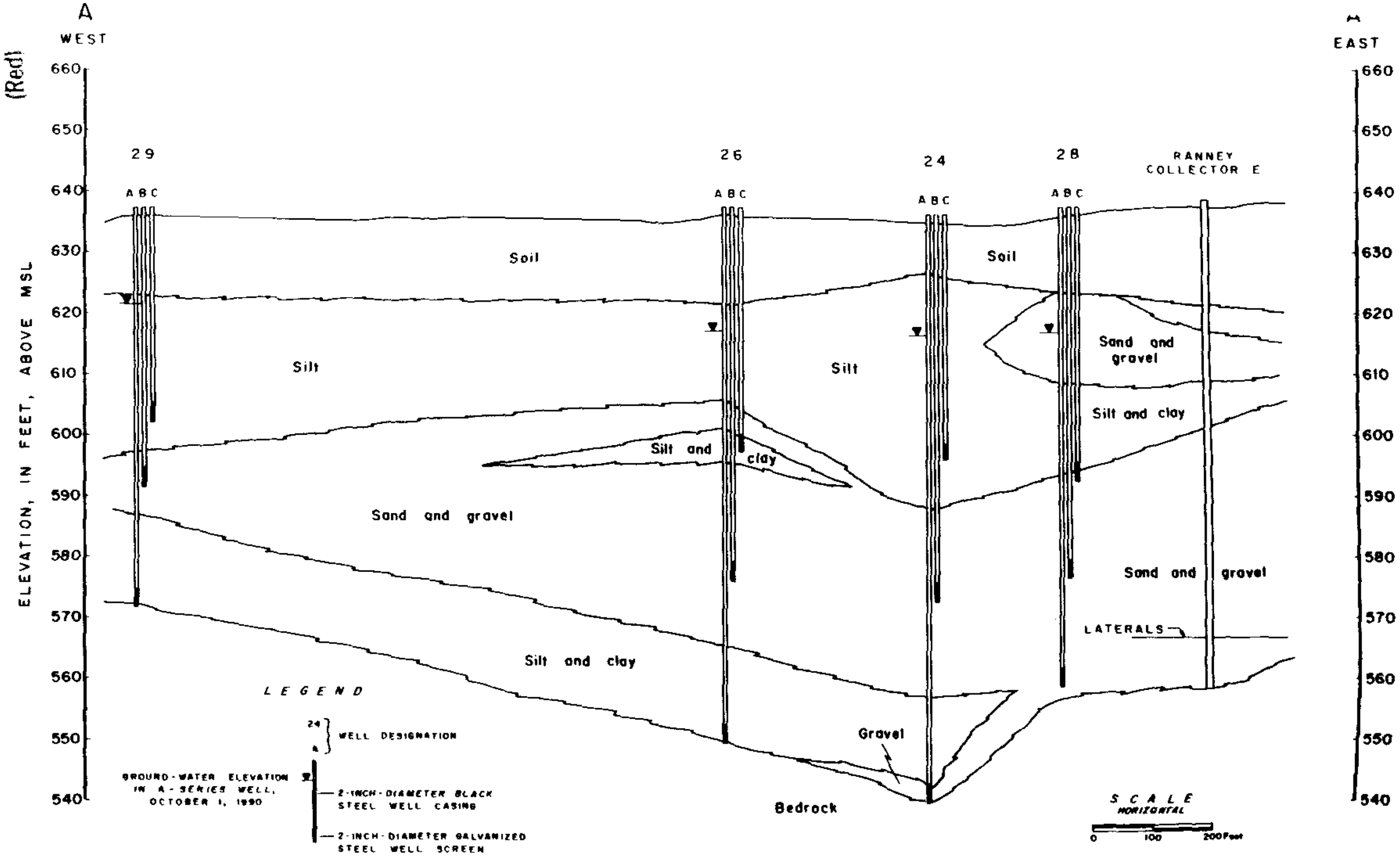

(REPRODUCED FROM 1978 GERAGHTY & MILLER, INC. REPORT)

SCALE: SHOWN	GENERALIZED GEOLOGIC CROSS SECTION A - A'	FIGURE
GERAGHTY & MILLER, INC. Environmental Services	ALLIED - SIGNAL, INC.	2
	MOUNDSVILLE WEST VIRGINIA	

DATE: 14NOV90 | PRJCT. NO.: PA07301 | FILE NO.: | CAD FILE: NON-CAD | COMPILER: T. RATVASKY | MGR.: T. RATVASKY | DRAFTER: S. LOFTUS

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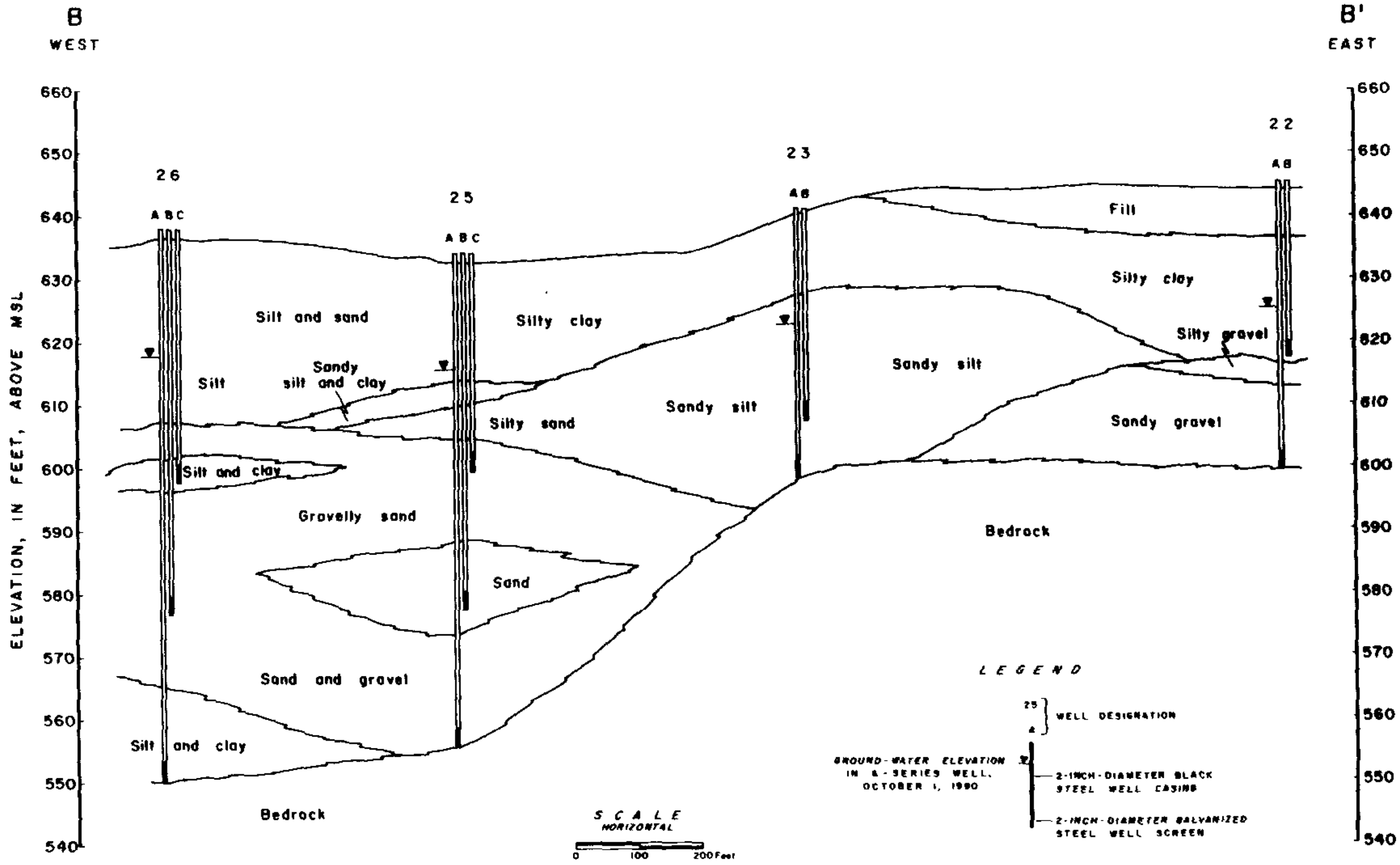

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SCALE: SHOWN

GERAGHTY & MILLER, INC.
Environmental Services

GENERALIZED GEOLOGIC CROSS SECTION B - B'

ALLIED - SIGNAL, INC.

MOUNDSVILLE WEST VIRGINIA

FIGURE 3

APPENDIX A

GROUND-WATER AND WELL HEAD ELEVATION DATA

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COMPARISON OF WELL TOP ELEVATIONS
ALLIED PARK SITE
MOUNDSVILLE, WEST VIRGINIA

WELL DESIGNATION	MEASURING POINT ELEVATION (feet above MSL) esurveyed 10/1990)	EASURING POINT ELEVATION (feet above MSL) (surveyed 5/1978)	ELEVATION DIFFERENCE (1) (feet)	MEASURING POINT ELEVATION (feet above MSL) (Resurveyed 1/1982)	ELEVATION DIFFERENCE (2) (feet)
20A	660.60	659.27	1.33	660.66	-0.06
20B	660.33	657.86	2.47	660.37	-0.04
20C	660.25	657.51	2.74	660.29	-0.04
22A	642.09	646.65	-4.56	641.15	0.94
22B	642.28	644.17	-1.89	642.01	0.27
23A	640.81	640.79	0.02	640.83	-0.02
23B	640.91	638.82	2.09	640.44	0.47
24A	641.31	639.04	2.27	641.44	-0.13
24B	641.17	636.92	4.25	641.30	-0.13
24C	641.18	636.64	4.54	641.31	-0.13
25A	639.50	635.38	4.12	639.61	-0.11
25B	639.42	634.83	4.59	639.51	-0.09
25C	639.46	634.33	5.13	639.55	-0.09
26A	641.12	638.65	2.47	641.23	-0.11
26C	641.06	638.09	2.97	641.17	-0.11
27A	642.78	642.79	-0.01	642.93	-0.15
27B	641.39	641.41	-0.02	641.53	-0.14
27C	642.46	642.47	-0.01	642.59	-0.13
28A	641.08	641.34	-0.26	641.22	-0.14
28B	641.09	640.04	1.05	641.23	-0.14
28C	641.08	640.33	0.75	641.22	-0.14
29B	637.99	638.11	-0.12	638.11	-0.12
29C	638.39	636.68	1.71	636.68	1.71
30A	640.30	638.62	1.68	640.45	-0.15
30B	640.28	638.31	1.97	640.42	-0.14
30C	640.38	639.25	1.13	640.52	-0.14
RW E	659.16	658.30	0.86	NA	NA

ALLIED-SIGNAL MONITORING WELL
WATER LEVELS AND ELEVATIONS

Date: 10/1/90
Project No.: PA07301
Sampler: RATVASKY

WELL DESIGNATION	MEASURING POINT ELEVATION (1) (feet above MSL)	DEPTH TO WATER (feet above M.P.)	GROUND WATER ELEVATION (feet above MSL)
20A	660.60	38.68	621.92
20B	660.33	38.25	622.08
20C	660.25	38.31	621.94
22A	642.09	18.91	623.18
22B	642.28	18.67	623.61
23A	640.81	17.40	623.41
23B	640.91	17.31	623.60
24A	641.31	18.64	622.67
24B	641.17	18.49	622.68
24C	641.18	18.56	622.63
25A	639.50	16.90	622.60
25B	639.42	16.18	623.24
25C	639.46	15.80	623.66
26A	641.12	18.68	622.44
26C	641.06	17.80	623.26
27A	642.78	20.69	622.09
27B	641.39	19.28	622.11
27C	642.46	19.66	622.80
28A	641.08	18.73	622.35
28B	641.09	20.66	620.43
28C	641.08	18.30	622.78
29B	637.99	14.47	623.52
29C	638.39	14.54	623.85
30A	640.30	37.12	603.18
30B	640.28	41.75	598.53
30C	640.38	17.69	622.69
RW E	659.16	37.92	621.24

MSL: Mean Sea Level
M.P.: Measuring Point
(1) Monitoring well measuring point elevations resurveyed by Stegman & Schellhase, Inc. on October 1, 1990

WELL DESIGNATION	MEASURING POINT ELEVATION (1) (feet above MSL)	DEPTH TO WATER (feet above M.P.)	GROUND WATER ELEVATION (feet above MSL)
B-1A	647.86	18.20	629.66
B-1B	647.69	20.67	627.02
B-2A	643.42	20.05	623.37
B-2B	643.70	19.95	623.75
B-3A	648.03	18.46	629.57
B-3B	648.22	18.53	629.69
B-4A	649.60	27.10	622.50
B-4B	649.88	27.47	622.41
B-5A	647.71	26.07	621.64
B-5B	647.93	Plugged	Plugged
B-6A	667.92	Plugged	Plugged
B-6B	667.07	Plugged	Plugged
B-7A	681.48	NM	NM
B-7B	681.26	NM	NM
B-8A	692.41	38.59	653.82
B-8B	692.22	Possibly Plugged	Possibly Plugged
B-9A	644.50	16.88	627.62
B-9B	644.50	16.99	627.51

MSL: Mean Sea Level
M.P.: Measuring Point
NM: Not Measured
(1) Monitoring well measuring point elevations surveyed in January 1982

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GROUND-WATER ELEVATION DATA
LCP CHEMICALS - WEST VIRGINIA, INC.

Moundsville, West Virginia

Project No: PA07301
Date: 10/1/90
Personnel: RATVASKY

Well ID	Reference Point (ft above MSL)	Elevation at Top of Reference Point (feet)	Depth to Water Below Top of Reference Point (feet)		Elevation of Ground Water (ft above MSL)
Observation Wells					
*1	Steel	707.10	33.28		673.82
2	Steel	700.39	60.89		639.50
*5	Steel	670.60	48.91		621.69
7	Steel	643.32	20.33		622.99
*9	Steel	642.24	19.19		623.05
10	Steel	668.42	45.25		623.17
*11	Steel	680.24	57.21		623.03
*12	Steel	693.70	70.68		623.02
13	Steel	705.20	57.41		647.79
14	Steel	686.63	63.42	**	623.21
32A	Steel	652.86	39.44	**	613.42
32B	Steel	653.22	31.76		621.46
32C	Steel	652.39	NM		NM
33A	Steel	631.84	NM		NM
33B	Steel	681.84	NM		NM
34A	Steel	639.56	NM		NM
34B	Steel	638.39	NM		NM
34C	Steel	640.17	18.13		622.04
37A	Steel	647.94	NM		NM
37B	Steel	647.74	NM		NM
*38A	Steel	638.12	16.35	**	621.77
*38B	Steel	638.57	16.49		622.08
*38C	Steel	638.88	NM		NM
39	Steel	689.17	36.24		652.93

* = *Monitoring Wells which are sampled quarterly*
NM = Not Measured
** = Condition of monitoring well may influence ground-water elevation

GROUND-WATER ELEVATION DATA
LCP CHEMICALS – WEST VIRGINIA, INC.

Moundsville, West Virginia

Project No: PA07301
Date: 10/1/90
Personnel: RATVASKY

Well ID	Reference Point (ft above MSL)	Elevation at Top of Reference Point (feet)	Depth to Water Below Top of Reference Point (feet)	Elevation of Ground Water (ft above MSL)
HG-Series Wells				
*HG-1	PVC	669.42	31.11	638.31
*HG-2A	PVC	668.85	46.49	622.36
*HG-2B	PVC	669.10	46.77	622.33
*HG-2C	PVC	669.36	46.98	622.38
*HG-3	PVC	669.15	46.70	622.45
HG-4	PVC	700.34	NM	NM
HG-5A	PVC	677.85	54.95	622.90
HG-5B	PVC	678.38	55.65	622.73
HG-6A	PVC	660.26	38.15	622.11
HG-6B	PVC	660.13	37.80	622.33
HG-7A	PVC	660.28	38.00	622.28
HG-7B	PVC	660.23	NM	NM
HG-8A	PVC	659.70	37.32	622.38
HG-8B	PVC	659.62	37.07	622.55
HG-9A	PVC	642.63	20.14	622.49
HG-9B	PVC	642.70	20.15	622.55
HG-10A	PVC	641.87	19.54	622.33
HG-10B	PVC	642.05	19.66	622.39

* = Monitoring Wells which are sampled quarterly
NM = Not Measured

GROUND-WATER ELEVATION DATA
LCP CHEMICALS - WEST VIRGINIA, INC.

Project No: PA07301
Date: 10/1/90
Personnel: RATVASKY

Moundsville, West Virginia

Well ID	Reference Point (ft above MSL)	Elevation at Top of Reference Point (feet)	Depth to Water Below Top of Reference Point (feet)	Elevation of Ground Water (ft above MSL)
MW Series Wells				
MW-1	PVC	704.94	46.58	658.36
MW-2A	PVC	685.39	62.39	623.00
MW-2B	PVC	684.96	NM	NM
MW-3A	PVC	642.40	19.29	623.11
MW-3B	PVC	642.52	19.43	623.09
MW-4A	PVC	643.82	20.88	622.94
MW-4B	PVC	643.74	20.83	622.91
MW-5A	PVC	645.94	23.20	622.74
MW-5B	PVC	646.01	23.14	622.87
MW-6A	PVC	648.69	26.97	621.72
MW-6B	PVC	648.40	26.67	621.73
MW-7A	PVC	639.42	17.32	622.10
MW-7B	PVC	639.42	17.38	622.04
MW-8A	PVC	632.41	11.29	621.12
MW-8B	PVC	632.56	11.55	621.01
MW-8C	PVC	632.40	8.18	624.22
MW-9A	PVC	669.69	NM	NM
MW-9B	PVC	670.04	47.63	622.41
MW-10A	PVC	690.81	68.51	622.30
MW-10B	PVC	691.22	68.77	622.45
Barge Dock		649.80	25.46	624.34
*Ranney A		658.39	34.48	623.91
*Ranney D		658.39	47.63	610.76
*Moundsville Country Club Well				
*Washington Lands Well				
MW-11B	PVC	685.96	62.96	623.00
MW-12	PVC	687.16	NM	NM
MW-13	PVC	687.53	NM	NM
MW-14	PVC	686.58	NM	NM

* = *Monitoring Wells which are sampled quarterly*
NM = *Not Measured*

ORIGINAL
(Red)

GROUND-WATER ELEVATION DATA
LCP CHEMICALS - WEST VIRGINIA, INC.

Project No: PA07301
Date: 10/1/90
Personnel: RATVASKY

Moundsville, West Virginia

Well ID	Reference Point (ft above MSL)	Elevation at Top of Reference Point (feet)	Depth to Water Below Top of Reference Point (feet)	Elevation of Ground Water (ft above MSL)
Others				
P-1	PVC	639.99	17.66	622.33
P-2A	PVC	671.46	48.61	622.85
P-2B	PVC	671.45	48.60	622.85
TW-1	PVC	652.93	31.28	621.65
TW-2	PVC	653.12	31.45	621.67
TW-3	PVC	652.57	30.83	621.74
TW-4	PVC	645.74	24.40	621.34
TW-5	PVC	656.81	NM	NM
TW-6	PVC	662.25	40.56	621.69
RW-1	PVC	651.34	NM	NM
RW-2	PVC	650.13	NM	NM
RW-3	PVC	650.75	NM	NM

** = sampled quarterly*

Memorandum

ALLIED Engineered Materials

Allied-Signal Inc.
Morris Township, New Jersey

ORIGINAL (Red)

Date: February 1, 1991

To: Copyholders

From: L. A. Mattioli, Delaware

Subject: Moundsville - Geraghty & Miller Groundwater Report

Enclosed is a copy of the final report, drafts of which were sent to you early in January. The report will be submitted to WVDNR as our second half 1990 semi-annual water table level study required by the Consent Decree.

The purpose of the report was to obtain independent assurance that we have an effective monitoring program and are preventing off-site migration of contaminants to the Ohio River. The report confirms this and additionally suggests deletion of certain wells we are currently monitoring.

A copy of the transmittal letter will be sent to you under separate cover after the usual review procedures.

L. A. Mattioli

L. A. Mattioli MDV1.032

cc: J. E. Cooper, MEY-4 (with encl.)
    C. D. Smith, NIC-5 "
    S. R. Stevinson, AB-2 "
    D. P. DeNoon, Hanlin "
    R. L. Higgins, Olin "